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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/933,822	08/22/2001	Xavier Michel	SON-2199	7278

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EXAMINER

EDWARDS, PATRICK L

ART UNIT	PAPER NUMBER
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2621

DATE MAILED: 09/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/933,822

Applicant(s)

MICHEL, XAVIER

Examiner

Patrick L. Edwards

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 July 2005.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-7 and 9-15 is/are rejected.
7) ☒ Claim(s) 8 is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The response received on 07 July 2005 has been placed in the file and was considered by the examiner. An action on the merits follows.

Response to Arguments

2. The arguments filed on 07 July 2005 have been fully considered. A response to these arguments is provided below.

35 USC 112, Second Paragraph Rejections

Procedural Posture:

Claim 2 was previously rejected under 112(2) on two separate grounds. In the advisory action, one of the those grounds of rejection was withdrawn, but the second ground was not.

Summary of Argument:

Applicant traverses the 112(2) rejection to claim 2 and alleges that the edge connecting process can be performed prior to the calculation of local energy. Applicant argues that this operations are not inconsistent with one another and provides supporting evidence from the applicant's specification (see remarks pgs. 7-8). Specifically, applicant agrees that the edge connection process does require the determination of right and left diagonal energies, but argues that the right and left diagonal energies are not the same as the claimed term "local energy."

Examiner's Response:

Applicant's arguments have been fully considered and are persuasive. The "local energy" term recited in the claim requires additional steps besides the calculations of diagonal energies. The examiner had previously interpreted the calculations of diagonal energies to be "local energy." When "local energy" is given the more narrow construction explained by the applicant, then this inconsistency goes away. However, for purposes of applying prior art, applicant is respectfully reminded that the claims are always given their broadest reasonable interpretation as instructed by MPEP 2106.

Prior Art Rejections

Summary of Argument:

1. Respecting independent claims 1, 11, and 12, applicant alleges that Aoyama fails to disclose calculating a local energy of an original image based on two rows of pixels. Specifically, applicant argues that "the calculation of the image density gradient of Aoyama is not analogous to the local energy calculation, which as describe[d] above includes calculating the pixel differences for selected diagonal lines and summing the absolute values of the differences (see remarks pg. 10).

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2. Applicant traverses the 103 rejection to claim 4 over the combination of Aoyama and Moronaga, and alleges that Moronaga fails to disclose that when the local energy is greater than a predetermined threshold value, said edge enhancement means performs a one-dimension filtering process (see remarks pg. 12).

3. Applicant traverses the 103 rejection to claim 8 over the combination of Aoyama and Sato, and alleges that Sato fails to disclose all of the elements of the claim. Specifically, applicant argues that Sato fails to disclose all of the details of the multiplication operation between a first and second difference.

Examiner's Response:

1. Applicant's argument has been fully considered but is unpersuasive. The examiner agrees that Aoyama does not disclose a local energy calculation exactly as described in the applicant's specification. But the point is irrelevant. The claims are given their broadest reasonable interpretation and limitations from the specification are not read into the claims (see MPEP 2106). Aoyama discloses all the limitations that the claims require.

2. Applicant's argument has been fully considered but is unpersuasive. Moronaga was brought in to meet the limitations of the 1-D filtering process. The remaining limitations were disclosed in the Aoyama reference. Applicant's argument, therefore, is directed to limitations that the Moronaga reference was not intended to meet.

3. Applicant's argument has been fully considered and is persuasive.

Allowable Subject Matter

3. Claim 8 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 5-7, 11 and 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Aoyama et al. (USPN 6,535,651).

With regard to claim 1, which is representative of claim 11, Aoyama discloses an energy calculating means for calculating local energy of an original image based on two rows of pixels (col. 38 lines 7-8 in conjunction with

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Figure 14). The 'image density gradient vector' disclosed in Aoyama qualifies as 'local energy' as recited in the claim. As can be seen in Figure 14 (and many of the other figures as well), this calculation is based on two rows of pixels (pixels Sa and Sb being on one row; and pixels Sc and Sd being on a second row).

Aoyama further discloses a detections means for detecting the direction of an edge on the basis of the local energy calculated by the energy calculating means (col. 42 line 60 – col. 43 line 4 and col. 25 line 65 – col. 26 line 6).

Aoyama further discloses interpolation means for interpolating a new pixel from a pixel of said original image on the basis of the direction of the edge detected by the detection means (col. 29 line 14 – col. 30 line 56). The cited Aoyama excerpt shows several examples of how a new pixel is interpolated on the basis of the detected edge direction.

Aoyama further discloses edge enhancement means for performing an edge enhancement process on the basis of said local energy calculated by said energy calculating means (col. 35 lines 29-67 and col. 39 lines 36-48 in conjunction with Figure 12). The combination of elements 44', 43', 45' and 60 as disclosed in Figure 12 of Aoyama is analogous to the claimed edge enhancement means. The cited passage details how the 'local energy' (i.e. the image density gradient vector) is used to determine coefficients for a coefficient correction operation which is analogous to the claimed 'edge enhancement process' in that it produces sharp image edge portions (col. 39 lines 47-48).

The limitations recited in the preamble of the claim which are not included in the claim body have not been given any patentable weight and will not be discussed. Please refer to MPEP § 2112.02 for further information regarding limitations recited in the preamble of a claim.

With regard to claim 12, a computer-readable recording medium that stores a program which causes the computer to execute the steps of a method is essential if the image processing method disclosed in Aoyama is to function. Therefore, a computer-readable recording medium is inherent in the teachings of Aoyama.

With regard to claim 5, Aoyama discloses that the interpolation means and the edge enhancement means perform the interpolation and the edge enhancement upon the original image in vertical and horizontal directions (col. 33 line 57 – col. 34 line 3).

With regard to claim 6, Aoyama discloses interpolating one new pixel from two pixels lying along the detected edge direction (col. 29 lines 29-38).

With regard to claim 7, Aoyama discloses performing linear interpolation when the edge is not detected by the detection means (col. 4 lines 55-59). The 'flat portion' of the image as disclosed in Aoyama is analogous to the claimed situation where an edge is not detected by the detection means (aoyama col. 4 lines 19-28). Aoyama generically discloses an 'interpolating operation process' in the cited passage, but later goes on to specify that this interpolation process can be a linear interpolation (Aoyama col. 41 lines 13-14 and 50-51).

With regard to claim 10, Aoyama discloses that when the value of Z is greater than or equal to 2, the interpolation and edge enhancement operation are performed until Z is less than 2 (Aoyama col. 39 line 59-65: the reference describes that when the scale factor Z is greater than or equal to 2, it will perform the interpolation and

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edge enhancement step until Z is less than 2). Aoyama further discloses performing an interpolation when the Z value is less than 2 (i.e. setting the value of the interpolation coefficients in accordance with the scale factor). This interpolation qualifies as the claimed second interpolation.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoyama as applied to claim 1 above, and further in view of Klassen (USPN 6,741,751). The arguments as to the relevance of Aoyama as applied above are incorporated herein.

With regard to claim 2, Aoyama fails to expressly disclose converting a loose connection of the original image into a tight connection before increasing the resolution of the image. Klassen, however, discloses connecting and strengthening edges in an image before increasing the resolution of said image (Klassen col. 3 lines 22-53). This operation (which is commonly referred to as anti-aliasing) is analogous to the claimed conversion of a loose connection to a tight connection, per the applicant's specification (see paragraph [0174]). It would have been obvious to one reasonably skilled in the art at the time of the invention to modify Aoyama's resolution increasing apparatus by connecting and strengthening the edges of an image before increasing resolution as taught by Klassen. Such a modification would have allowed for a system with improved rendition of text and synthetic graphics in the output image (Klassen col. 3 lines 43-44).

With regard to claim 3, Klassen discloses a system for anti-aliasing an input image before increasing its resolution (Klassen col. 5 lines 3-6). The claimed process of replacing the value of a particular pixel with the mean value of two pixels on the basis of pixels lying along a diagonal line is a common method of anti-aliasing which is very old and well known in the art (Official Notice). It would have been obvious to one reasonably skilled in the art at the time of the invention to specify that Klassen's anti-aliasing system replaced a pixel value with the mean value of two pixels lying along a diagonal line. Such a modification would have allowed for a simple and well known method of producing cleaner, more well defined edges in an image.

8. Claims 4 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoyama as applied to claim 1 above, and further in view of Moronaga et al. (USPN 5,229,864). The arguments as to the relevance of Aoyama as above are incorporated herein.

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With regard to claim 4, Aoyama discloses comparing a local energy calculation to a threshold to determine the existence of an edge, but fails to expressly disclose that the detected edges are enhanced by using a one-dimensional filtering process, such that the values of pixels are multiplied by corresponding coefficients of a 1-D edge building filter which include a scaling factor, and the respective products are added together. Moronaga, however, explicitly recites a one-dimensional filter for edge enhancement (Moronaga col. 6 lines 38-68). It would have been obvious to one reasonably skilled in the art at the time of the invention to modify Aoyama's image processing apparatus by enhancing the edges with a 1D filter as taught by Moronaga. Such a modification would have allowed for well known method of accentuating the edges of the image (Moronaga col. 6 lines 65-68).

With regard to claim 14, Moronaga discloses a coefficient value between 0.5 and 1.4 (Moronaga col. 6 line 65).

9. Claims 9, 13, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoyama as applied to claim 1 above, and further in view of Ng et al. (USPN 5,450,531) and Russ (The Image Processing Handbook -- 1995). The arguments as to the relevance of Aoyama as applied above are incorporated herein.

With regard to claim 9, which is representative of claims 13 and 15, Aoyama discloses calculating local energy, but fails to expressly disclose creating an energy map. Ng, however, discloses creating a gradient map for every pixel in an input image (Ng Figure 1 elements 12 and 14 with col. 4 line 67 – col. 5 line 5). The gradient magnitude map disclosed in Ng is analogous to the claimed energy map. It would have been obvious to one reasonably skilled in the art at the time of the invention to modify the Aoyama's energy calculating means by using the calculated local energies for each pixel to create an energy map as taught by Ng. Such a modification would have allowed for an apparatus that saved the calculated energy values for each pixel in an input image and consequently avoid repeated calculations. This would have made for a faster, more efficient system.

With regard to the added limitation Aoyama discloses calculating local energy, but fails to expressly disclose calculating the local energy by subtracting pixel values of pixels in a right column of the original image from corresponding pixel values of pixels located in a left column of the original image, calculating an absolute value for each pixel value difference, calculating a sum of the absolute values, wherein the pixels in the right column of the original image are diagonally spaced from the corresponding pixels in the left column of the original image. However, this method of calculating local energy is well known in the art as a Roberts cross operator. This is shown at pages 236-237 of Russ. It would have been obvious to one reasonably skilled in the art at the time of the invention to modify Aoyama's calculation of local energy by using a well known method for calculating a local energy map or gradient map as taught by Russ. Such a modification would have allowed for a local energy map that took edge direction into account and utilized a well known algorithm.

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Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick L Edwards whose telephone number is (571) 272-7390. The examiner can normally be reached on 8:30am - 5:00pm M-F.

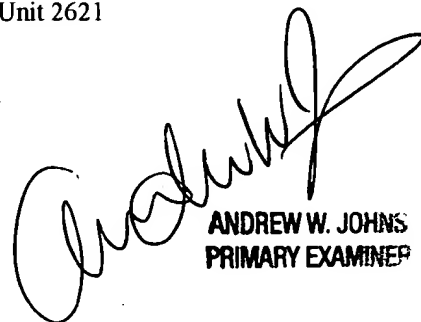
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joe Mancuso can be reached on (571) 272-7695. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Patrick L Edwards

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ANDREW W. JOHNS
PRIMARY EXAMINER